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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/826,803

04/15/2004

Frank S. Geefay

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08/26/2004

AGILENT TECHNOLOGIES, INC.

Legal Department, DL429

Intellectual Property Administration

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EXAMINER

LEE, HSIEN MING

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 08/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/826,803

Applicant(s)

GEEFAY ET AL.

Examiner

Hsien-Ming Lee

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 4/15/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE  
PRIMARY EXAMINER

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### Remarks

1. Applicants' cancellation to claims 12-22 is acknowledged. Thus, claims 1-11 are pending in the application.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Moriizumi et al. (US 6,485,814).

Moriizumi et al. teach a method for creating a sloped via contact on a wafer having front and back sides, comprising:

- providing a contact 8 on the front side of the wafer 6 (Fig.3);
- forming a sloped via 10 in the wafer 6 under the front contact, the sloped via 10 increasing in width (Fig.4);
- coating by plating the walls of the sloped via 10 with contact material 13 (i.e. Au plated layer) (Fig.5 and col. 4, lines 45-47); and
- providing a contact 14/5 on the backside of the wafer 6, electrically connected to the front side contact 8 through the sloped via 10 (Fig.5).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriizumi et al. (US '814) in view of Thomas (US 6,326,689).

In re claims 2-3, Moriizumi et al. do not expressly teach that the sloped via is no wider than 80  $\mu\text{m}$  or 50  $\mu\text{m}$ .

Thomas, however, in an analogous art of forming sloped via contact, teach that the width of the sloped via involves the required dimension of the contact area needed for conductive material formed in the sidewalls of the sloped via (col. 5, lines 52-63).

Therefore, one of the ordinary skill in the art, at the time of the invention was made, would have been motivated to optimize the width of the sloped via, as suggested by Thomas, in the method of Moriizumi et al. for the purpose of obtaining a suitable dimension of contact area associated with the slope via.

In re claim 4, Moriizumi et al. do not teach leaving a thickness of at least 1000 Angstroms of conductive material in the sloped via where the via width is the narrowest.

Thomas, however, remedies the above deficiency in Moriizumi et al. in that Moriizumi et al. teach that the selection of the thickness of the conductive layer 314a and 314b involves the desired width of back side opening 304 in the wafer 302 (Fig. 3B).

Therefore, one of the ordinary skill in the art, at the time of the invention was made, would have been motivated to coat a desired thickness of the conductive material in the sloped via and leaves a desired thickness of the conductive material at the narrowest-width via, as suggested by Thomas, in the method of Moriizumi et al. for the purpose of obtaining a suitable dimension of via opening.

In re claims 5 and 6, Moriizumi et al. teach coating the walls by plating a gold-containing conductive material (col. 4, lines 45-47).

In re claim 7, Moriizumi et al further teach forming a via 10 and widening the via 10 so that its width increases from the front to back (Fig.4 and col. 4, lines 16-25).

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moriizumi et al. (US '814) in view of Thomas (US '689) as applied to claim 7 above, and further in view of Wang et al. (US 6,662,419).

Moriizumi et al. in view of Thomas do not teach forming the via with sloped sidewall by deep reactive ion etching (DRIE).

However, Wang et al, in an analogous art of forming the sloped via 500 (Fig.5B), teach using DRIE for producing sloped sidewalls 502 and 504 (col. 5, lines 25-29).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to use DRIE, as taught by Wang et al., in the method of Moriizumi et al. in view of Thomas, since by this manner it would satisfactory form the sloped via in the wafer.

7. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriizumi et al. in view of Thomas and Wang et al. as applied to claim 8 above, and further in view of Hubacher (US 5,536,677).

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Moriizumi et al. in view of Thomas and Wang et al. do not teach forming the via using a one-sided etch or two-sided etch.

However, Hubacher, in an analogous art, teaches forming the sloped via using one-sided etch or two-sided etch, dependent upon the desired aspect ratio (col. 5, lines 20-30).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to use either one-sided etch or two-sided etch, as taught by Hubacher, in the method of Moriizumi et al. in view of Thomas and Wang et al., since by this manner it would satisfactory form a desired via with the desired aspect ratio of the via.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moriizumi et al. (US '814) in view of Thomas (US '689) as applied to claim 7 above, and further in view of Siniaguine (US 6,184,060).

Moriizumi et al. (US '814) in view of Thomas do not teach using an isotropic plasma etch for forming the via.

Siniaguine, however, teaches using the isotropic plasma etch for forming the sloped via (col. 3, lines 3-7).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to use isotropic plasma etch, as taught by Siniaguine, in the method of Moriizumi et al. in view of Thomas, since by this manner it would satisfactory etch the wafer to form the sloped via.

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9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (8:00 ~ 6:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HSIEN-MING LEE  
PRIMARY EXAMINER  
Hsien-Ming Lee  
Primary Examiner  
Art Unit 2823

August 24, 2004